Photoinduced piezooptical changes caused by microsecond CO_2 Infrared lasers in lead-germanate rare earth tridoped glasses

Abstract

We have observed substantial influence of the illumination by 3.5 μs CO_2 laser on the piezooptical coefficients of 59 PbO - 41 GeO_2 (in wt.%) glasses prepared with Tm_2O_3, Er_2O_3, Yb_2O_3 using the following concentrations (in wt.%): B-Tm_2O_3 (0.5)/Yb_2O_3 (1.0)/Er_2O_3(0.5); C-Tm_2O_3(0.5)/Yb_2O_3(1.0)/Er_2O_3 O(1.0); D-Tm_2O_3 (0.5)/Yb_2O_3 (1.0)/Er_2O_3 (2.0). We have found that the maximal changes were observed for B samples that contain the lowest concentration of Er_2O_3. The maximal changes are observed around 360 nm near the fundamental absorption edge. There exists some correlation between the maximal intensities of the photoluminescence and the maximal piezooptical changes. The CO_2 lasers cause preliminary photothermal changes. The existence of the maxima may be caused by a competition between the phonon and anharmonic phonon subsystems, which are very sensitive to the temperature.